A Report on Cephalopods Collected by Stanford Oceanographic Expedition 20 to the Eastern Tropical Pacific Ocean September to November, 1968

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(1 Text figure)

INTRODUCTION

THE CEPHALOPODS collected by the Stanford Oceanographic Expedition 20 are described and their location of capture noted in order to increase recorded knowledge of cephalopod fauna of the eastern tropical Pacific Ocean. The expedition, aboard the RV "*Te Vega*", left Guayaquil, Ecuador on 17 September, 1968 and arrived in San Diego, California on 29 November, 1968. The cruise track and stations where cephalopods were collected are shown in Figure 1.

Reports on the cephalopod fauna of the eastern tropical Pacific are few. HOYLE (1904), ROBSON (1948), CLARKE (1966), MCGOWAN & OKUTANI (1968), OKUTANI & MCGOWAN (1969), ROPER (1969) and YOUNG (1971) have described various cephalopod species from this general area.

METHODS

The collection consists of 17 specimens held by the University of Victoria (UV) in the "*Te Vega*" collection (TVG). The 6 different species identified have been described in detail by previous authors; therefore, these descriptions will not be repeated here except for an outline of the distinguishing features. Five of the specimens are unidentifiable to species due to loss of parts, digested state and larval stage. Specimens were collected by Tucker trawl, bongo net and hand line. Three specimens of *Symplectoteuthis* were found among material regurgitated by a Colombian booby, *Sula leucogaster etesiaca* Thayer & Bangs, 1905.

The measurements and morphometric indices given in the systematic section and in Tables 1 and 2 are defined by Voss (1956). The eight morphological characteristics measured include: total length (TL); dorsal mantle length (ML); mantle width (MW); head width (HW); head length (HL); fin length (FL); fin width (FW); and arm length (AI - IV). Seven indices were calculated from these measurements: head width index (HWI); mantle width index (MWI); fin length index (FLI); fin width index (FWI); mantle arm index (MAI); arm length index (ALI); and head length index (HLI). In addition, length of the fin as measured along the plane of attachment (FL′) (BERRY, 1912) and the index for this measurement (FLI′) were used.

SYSTEMATIC SECTION

OCTOPODIDAE

Octopus sp.

Specimens: Two larvae, UV-TVG 4 and 5, ML 7.0 and 4.0 mm; station F-52, 4°53′N, 84°07′W, 2330 hrs., 20 October 1968; Tucker trawl, 100 m to surface.

Because of the small size of the specimens and lack of literature on larval octopods of this region, definite identification was not attempted. Both specimens are complete

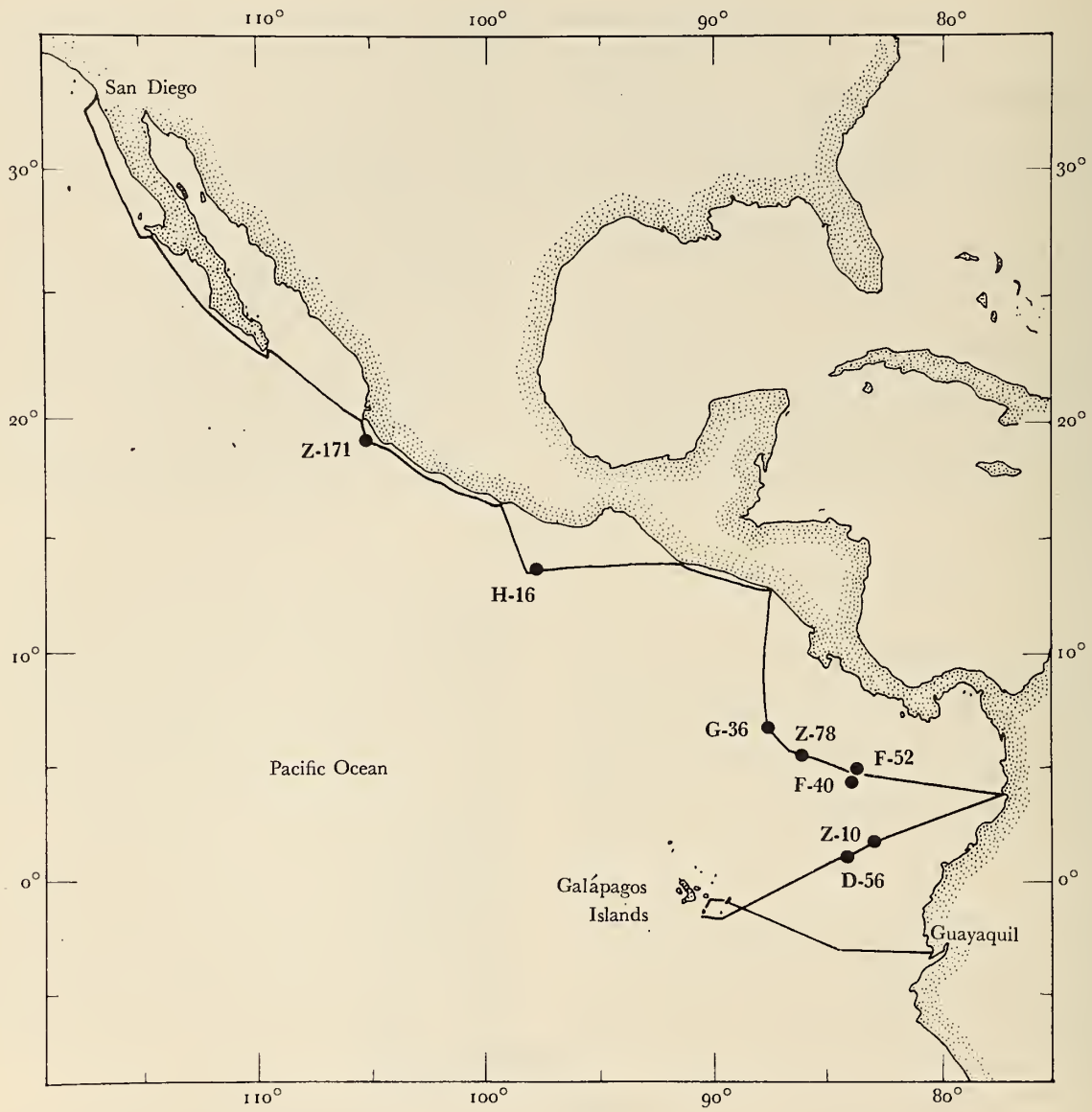

Figure 1

Cruise track and stations where cephalopods were collected on Stanford Oceanographic Expedition 20

Table 1

Measurements

Species	Collection No.	Measurements in millimeters TL	ML	MW	HL	HW	FL	FL'	FW	AI	AII	AIII	AIV
Octopus sp.	4	16	7	4.5	/	4.5	/	/	/	5.5	5.5	6	5.5
Octopus sp.	5	7	4	3	/	3	/	/	/	2.5	3	3	2.5
Japetella sp.	14	32	18	17*	/	13	/	/	/	8.5	10	12	9
Abraliopsis affinis	6	55	26	12	9	8*	20	17	33	16	16.5	17	18
Abraliopsis affinis	7	26	13	5	4	4	8.5	7	16	8	10	10	10
Abraliopsis affinis	15	73	30	10	12	11	22	19	31	30	31	27	32
Abraliopsis affinis	16	–	29	13*	–	–	20	18	32	–	–	–	–
Bathyteuthis abyssicola	13	35*	–	–	7	9	–	–	–	8	8	9	9
Bathyteuthis bacidifera	1	22	12	6	5	7	3	2	4	3.5	4	4	4.5
Bathyteuthis bacidifera	2	35	16	10	8	13	6.5	4	11	7	10	10	11
Symplectoteuthis oualaniensis	8	24	15	5	4	4	4	3	7	4	5	5	3
Symplectoteuthis oualaniensis	10	90*	61	13	9	11	20*	17*	–	19*	22*	25*	20*
Symplectoteuthis oualaniensis	11	–	55*	16	11	13	–	–	–	14*	19*	14*	14*
?*Symplectoteuthis* sp.	12	64*	–	–	–	–	–	–	–	–	–	–	–
?*Symplectoteuthis* sp.	9	–	8	–	–	–	2	2	4	–	–	–	–
Dosidicus gigas	17	598	325	90*	65	55	63	49	204	195	202	200	187
Helicocranchia pfefferi	3	23	16	–	2	6	2	1	3	4	6	8	3

/ = measurement not applicable
* = measurement approximate
– = measurement not taken

Table 2

Morphometrics

Species	Collection No.	HWI	HLI	MWI	FLI	FLI'	FWI	MAI	ALI
Octopus sp.	4	64.3	/	64.2	/	/	/	116.7	37.5
Octopus sp.	5	75.0	/	75.0	/	/	/	133.3	42.9
Japetella sp.	14	72.2	/	–	/	/	/	150.0	37.5
Abraliopsis affinis	6	30.7*	34.6	46.2	76.9	65.4	127.0	69.2	32.7
Abraliopsis affinis	7	30.8	30.8	38.5	65.4	53.8	123.1	76.9	38.5
Abraliopsis affinis	15	36.7	40.0	33.3	73.3	63.3	103.3	106.7	43.8
Abraliopsis affinis	16	–	–	44.8*	69.0	62.1	110.3	–	–
Bathyteuthis abyssicola	13	–	–	–	–	–	–	–	25.7
Bathyteuthis bacidifera	1	58.3	41.7	50.0	25.0	16.7	33.3	37.5	20.5
Bathyteuthis bacidifera	2	81.3	50.0	62.5	40.6	25.0	68.8	68.8	31.4
Symplectoteuthis oualaniensis	8	26.7	26.7	33.3	26.7	20.0	46.7	33.3	20.8
Symplectoteuthis oualaniensis	10	18.0	14.8	21.3	32.8*	27.9*	–	41.0*	27.8*
Symplectoteuthis oualaniensis	11	23.6*	20.0*	29.1*	–	–	–	34.5*	–
?*Symplectoteuthis* sp.	12	–	–	–	–	–	–	–	–
?*Symplectoteuthis* sp.	9	–	–	–	25.0	25.0	50.0	–	–
Dosidicus gigas	17	16.9	20.0	27.7*	19.4	15.1	62.8	62.2	33.8
Helicocranchia pfefferi	3	37.5	12.5	–	12.5	6.3	18.8	50.0	34.8

/ = index not applicable
* = index approximate
– = index not calculated

and in good condition. They have 6 large reddish-brown chromatophores on the dorsal side of the head, a double row of very small chromatophores on the aboral side of each arm, and many small chromatophores of a faint reddish-brown on the dorsal posterior mantle and ventral mantle. Hoyle (1904) has described 10 species of Octopus from the eastern tropical Pacific.

Bolitaenidae

Japetella sp.

Specimens: One female, UV-TVG 14, ML 18mm; station H-16, 13°25'N, 98°14'W, 2000 hrs., 8 November 1968; bongo net, 1500m.

Japetella is a soft-bodied octopod with a wide mantle opening, uniserial suckers, and large eyes directed laterad. This specimen is a small, immature female and is in fair condition with a "wrinkled" mantle and damaged web. It has large, prominent gills which are 10mm long and have 11 lamellae in the outer demibranch. The funnel extends to the anterior edge of the eyes. It is broad and thin-walled. The funnel organ is not discernible. The longest arm is 37% of the total length of the animal. Due to the condition and immaturity of this specimen identification to species was not made. Hoyle (1904) has described two species of *Japetella* from this area.

Enoploteuthidae

Abraliopsis affinis (Pfeffer, 1912)

Specimens: One female, UV-TVG 6, ML 26mm; one male, UV-TVG 7, ML 13mm; station F-52, 4°53'N, 84°07'W, 2330 hrs., 20 October 1968; Tucker trawl, 100 m to surface.

One male, UV-TVG 15, ML 30mm; station Z-171, 19°04'N, 104°40'W, 2100 hrs., 18 November 1968; Tucker trawl, 300m to surface.

One male, UV-TVG 16, ML 29mm; mantle only, no data.

This species is noted for the arrangement of the photophores on the ventral side of the short, semi-fusiform mantle. They are situated in longitudinal rows with a wide, median bare area terminating in a bare, circular patch on the distal third of the mantle. There are 2 large and 3 small photophores on the eye ball. The club has 3 large and 4 small hooks in a double row and a semilunar membrane on the outer side. In the male, the right ventral arm is hectocotylized with 3 offset semilunar crests; the left ventral arm has a large swimming web 3 times the width of the arm.

The mature female, UV-TVG 6, has both tentacles and the right eye missing. Ripe eggs fill the posterior mantle cavity. Approximately 16 discharged spermatophores are embedded in the internal side of the dorsal mantle just to the right and behind the nuchal cartilage.

The male, UV-TVG 7, is a juvenile with reproductive organs in a developmental stage. The ventral mantle photophores are in the typical longitudinal arrangement but are not as numerous as in the adult.

UV-TVG 15 is a mature male in fair condition with the left tentacle and the tips of the first right and third left arm missing. The semilunar crests of the hectocotylus have been destroyed but the swimming web of the left ventral arm is well developed and in good condition. There are many mature spermatophores 6.5mm long in the penis and spermatophoric sac.

Although the fourth specimen, a mature male, UV-TVG 16, is missing the head, arms and data, it is included here because the mantle and internal organs are in very good condition and have the same morphology as UV-TVG 15. Spermatophores are present in the penis and the spermatophoric sac. Although they are much less numerous than in UV-TVG 15, they have the same length of 6.5mm.

McGowan & Okutani (1968) have compared *Abraliopsis affinis* with 3 other North Pacific species and have indicated its distribution in the eastern tropical Pacific. Hoyle (1904), Pfeffer (1912) and Clarke (1966) also note its distribution in this area.

Bathyteuthidae

Bathyteuthis abyssicola Hoyle, 1885

Specimens: One ?, UV-TVG 13, ML –; station G-36, 7°29'N, 87°58'W, 2055 hrs., 27 October 1968; Tucker trawl, 2500m to surface.

Bathyteuthis is noted for its deep red colour, separate terminal fins and 6 oval light organs, one each at the base of the first 3 dorsal pairs of arms. *Bathyteuthis abyssicola* is distinguished from *B. bacidifera* Roper, 1968, by its thick, fleshy, protective arm membranes unsupported by trabeculae, smaller gills and smaller tentacular clubs with fewer suckers; it differs from *B. berryi* Roper, 1968 by having smaller gills and fewer suckers on shorter, blunt arms (Roper, 1968: 171; table 1). The morphology and distribution of these species are discussed in detail in Roper (1969). This specimen of *B. abyssicola* is in poor condition. The mantle is everted and most of the internal organs are missing. Hoyle (1904), Robson (1948), Clarke (1966), and Roper (1969) note the presence of this species in the eastern tropical Pacific.

Bathyteuthis bacidifera Roper, 1968

Specimens: One juvenile, UV-TVG 1, ML 12mm; station D-56, 1°19′N, 84°07′W, 1415 hrs., 6 October 1968; Tucker trawl, 2500m to surface.

One female, UV-TVG 2, ML 16mm; station F-40, 4°29′N, 84°10′W, 2245 hrs., 19 October 1968; Tucker trawl, 200 - 350m to surface.

Bathyteuthis bacidifera possesses all those features previously mentioned for *Bathyteuthis*. Its most distinctive characteristic is the long free trabeculae which replace the protective membranes on the proximal half of the arms. Roper (1968, 1969) has made detailed descriptions of this species and notes its distribution as being bathypelagic in the " ... Eastern Pacific Equatorial Water Mass and possibly in the Indian Ocean Equatorial Water Mass (based on Chun's [1910] single specimen)." (Roper, 1969: 49).

The juvenile is missing the right tentacular club but it is in better condition than the female which is missing both tentacles and the right second arm. Both specimens possess the typical long, free trabeculae on the arms.

Ommastrephidae

Symplectoteuthis oualaniensis (Lesson, 1830)

Specimens: One juvenile, UV-TVG 8, ML 15mm; station F-52, 4°53′N, 84°07′W, 2330 hrs., 20 October 1968; Tucker trawl, 100m to surface.

One male, UV-TVG 10, ML 61mm; one?, UV-TVG 11, ML 55mm approx., station Z-78, 5°34′N, 86°58′W, 1930 hrs., 22 October 1968; from stomach of Colombian booby, *Sula leucogaster etesiaca* Thayer & Bangs, 1905.

The distinctive feature of juveniles and adults of this species is the fusion of the mantle with the funnel at the junction of the two perpendicular grooves of the funnel cartilage. Clarke (1965, 1966) describes a form of this species which has a large light organ on the dorsal mantle surface. This was not observed in any of the "*Te Vega*" specimens of *Symplectoteuthis*.

Symplectoteuthis oualaniensis has been reported from the eastern tropical Pacific by Hoyle (1904), Voss (1963), and Clarke (1966). It has also been recorded from the western Pacific Ocean and the Indian Ocean (Sasaki, 1929; Voss, 1963; Clarke, 1966).

The juvenile specimen, UV-TVG 8, is in good condition. Specimens UV-TVG 10 and 11 have been partially destroyed by digestion with the arms being the most affected. The dorsal and ventral sides of the stomach and caecum of specimen UV-TVG 10 are parasitized by approximately 140 immature specimens of the family Didymozoidae.

?Symplectoteuthis sp.

Specimens: One mantle with part of funnel, UV-TVG 9, ML 8mm; station F-52, 4°53′N, 84°07′W, 2330 hrs., 20 October 1968; Tucker trawl, 100m to surface.

One mantle, UV-TVG 12, ML 64mm; station Z-78, 5°34′N, 86°58′W, 1930 hrs., 22 October 1968; from stomach of a Colombian booby, *Sula leucogaster etesiaca*.

Specimen UV-TVG 9 was tentatively identified as *Symplectoteuthis* sp. on the basis of the structure of the funnel cartilage and its fusion to the mantle. The taxonomic position of UV-TVG 12 is even less certain as only the mantle remains. However, since it has the same form, colour and approximately the same size as specimens UV-TVG 10 and 11 and was collected from the same source at the same time, it has been placed under *?Symplectoteuthis* sp.

Dosidicus gigas (d'Orbigny, 1835)

Specimens: One male, UV-TVG 17, ML 325mm; station Z-10, 2°51′N, 83°16′W, 2030 hrs., 19 September 1968; hand line.

Dosidicus gigas is characterized by its robust arms which become very attenuate at the extremities where they bear numerous, very small suckers. Adults attain a very large size, between 4 and 12 feet [1.20m and 3.60m] (Phillips, 1961; Clarke, 1966). The "*Te Vega*" specimen is a small male in good condition. This species has been frequently recorded from the eastern tropical Pacific; a few of these authors are: d'Orbigny (*in* de Férussac & d'Orbigny, 1835), Steenstrup (1880), Berry (1912), Pfeffer (1912), Phillips (1933, 1961), and Clarke (1966). It has also been recorded from Australia and the Solomon Islands (Brazier, 1892 *in* Clarke, 1966).

Cranchiidae

Helicocranchia pfefferi Massy, 1907

Specimens: One juvenile, UV-TVG 3, ML 16mm; station F-40, 4°29′N, 84°10′W, 2245 hrs., 19 October 1968; Tucker trawl, 200 - 350m to surface.

This species is noted for its pedunculate fins, the regular arrangement of chromatophores in rows on the sides of the mantle, the extremely large funnel wich extends two thirds the length of the ventral arms and the large, stalked, conical eyes which bear a luminous organ. The arm formula is $3>2>1>4$ or $3>2>4>1$. *Helicocranchia pfefferi* has been reported from the Pacific only by Okutani & McGowan (1969). These specimens and the "*Te Vega*" specimen have a small swelling on the dorsal surface of the head. There is a semilunar chromatophore against the swelling and a pair of circular chromatophores

on both sides between the cephalic pillar and eye stalks. The "*Te Vega*" specimen is in good condition except that the tentacles and eyes have been damaged and some of the arm suckers are missing.

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